CMA 40-year GSI-based Reanalysis (CRA-40) Plan & Progress

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Present for

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Background

- Initiated from late 2013 by CMA high-level management.
- Newly formed a reanalysis branch at CMA/NMIC in early 2014 and project preparation
- More formally started from 2015 with dedicated project funding for next 4 years.
- Partnership with 8 institutes
  - National Meteorological Information Center (CMA/NMIC, lead institute)
  - National Meteorological Center (CMA/NMC)
  - National Satellite Meteorological Center (CMA/NSMC)
  - National Climate Center (CMA/NCC)
  - Institute of Atmospheric Physics, Chinese Academy of Sciences (CAS/IAP)
  - Beijing Normal University (BNU)
  - Nanjing University of Information Science & Technology (NUIST)
  - US NCAR

- Goal: produce a 40-year (1979-2018) global atmospheric reanalysis at ~30-km resolution by 2019 and then continue production in near real-time.

- Will also produce a 40-year global land-surface reanalysis.

Why another reanalysis?

- Prompt data service capability of NMIC (part of its function like NOAA/NCDC) by collecting more historical observations via reanalysis project

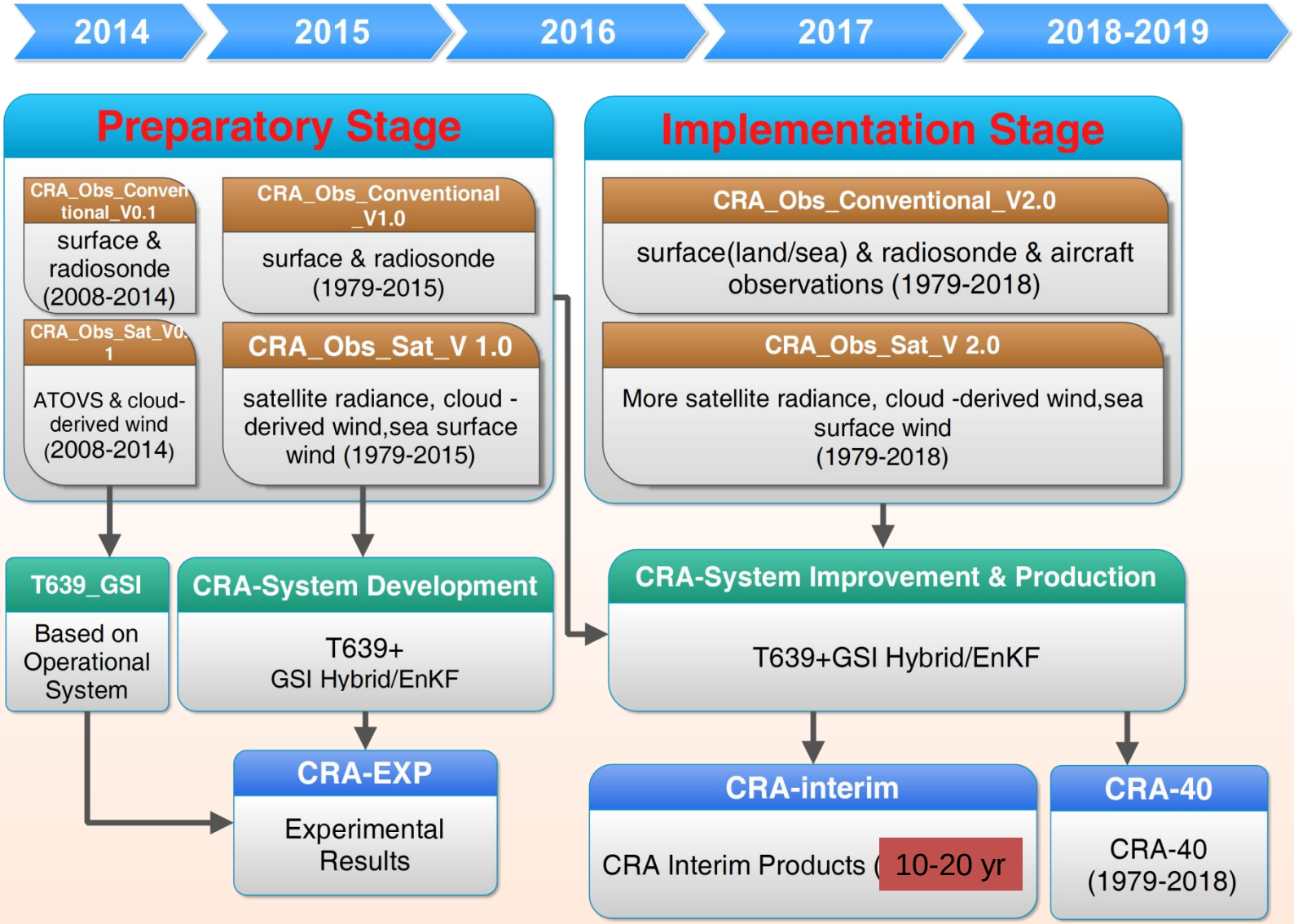
- Improve NCC's capability for climate monitoring/prediction with more timely reanalysis product

- Foster the optimal assimilation of observations at NMC, especially from Chinese observing networks.

Technical Approach

- CMA “GRAPES” global model is still under development, not yet in operation.
- Current global NWP operation is T639 (based on an old version of IFS model from ECMWF) plus an old GSI-3DVAR (2006 version)
- Proposed strategy is to use operational T639 model ,but upgrade DA system to the latest dual-resolution (T639/T213) GSI-hybrid/EnKF
  - Facilitate the assimilation of historical observations
- Land surface component plans to adopt NCAR DART system
- Technical plan may be subject to adjustments during execution of the project.

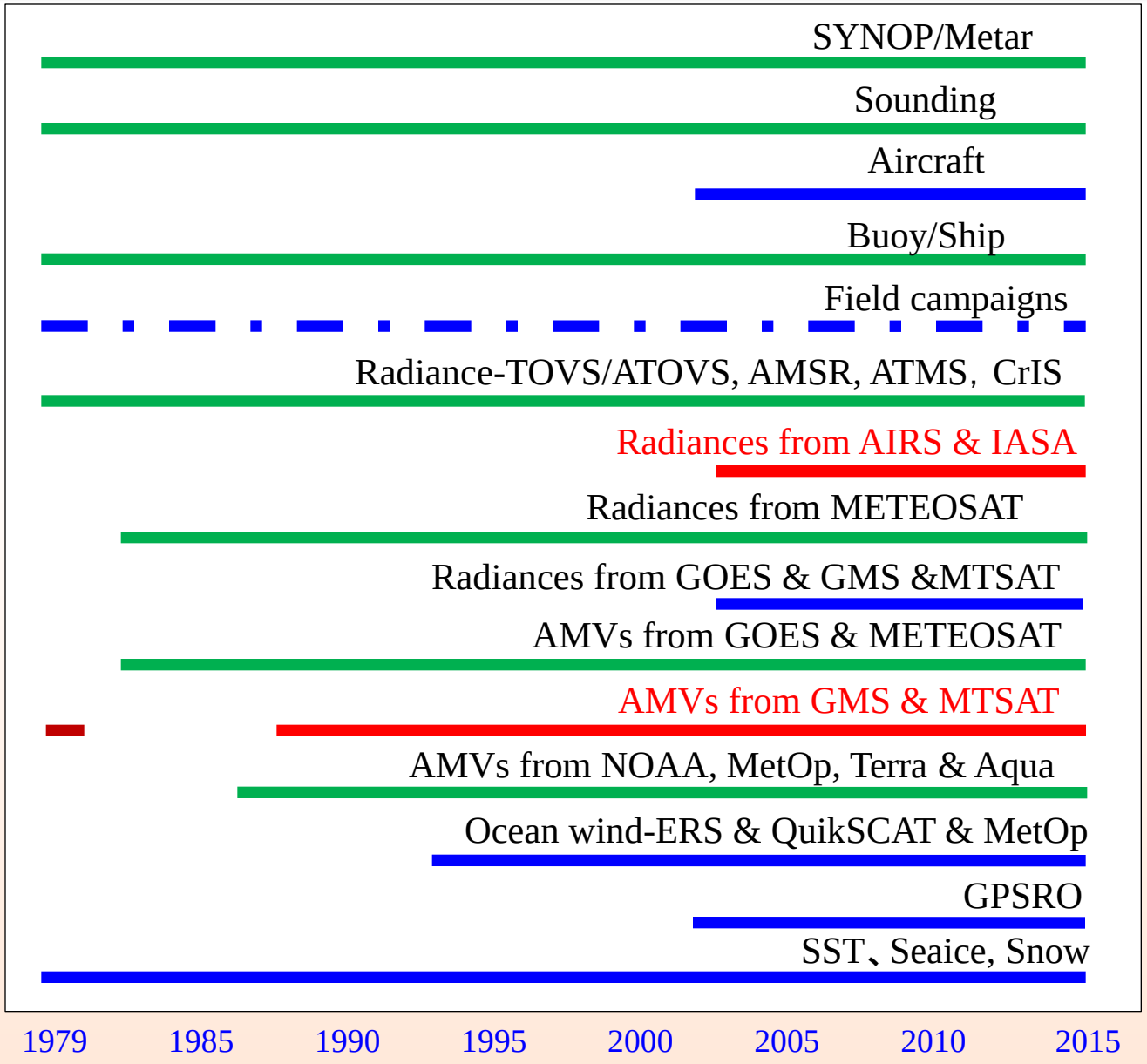
Project Timeline



Progress

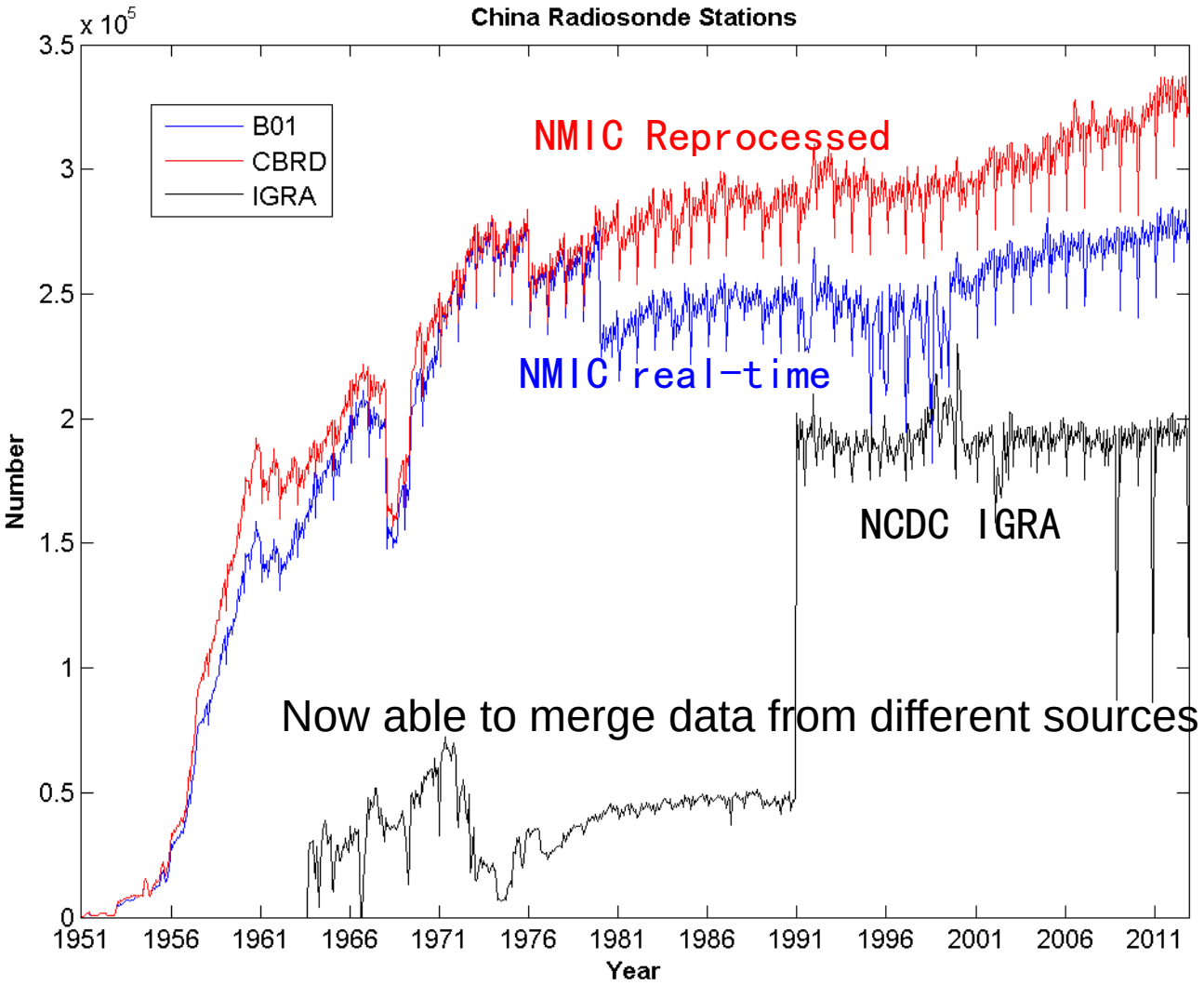
- Collection of conventional and satellite observations
- Began work in conversion of conventional data collected from various sources into PrepBufr format used in GSI
- Conversion of TOVS/ATOVS Level-1B radiance data into BUFR format used in GSI.
- Development of pre-evaluation system of historical data based on GSI and ERA-Interim reanalysis.
- Upgraded GSI to the community release version V3.3.

Data collection



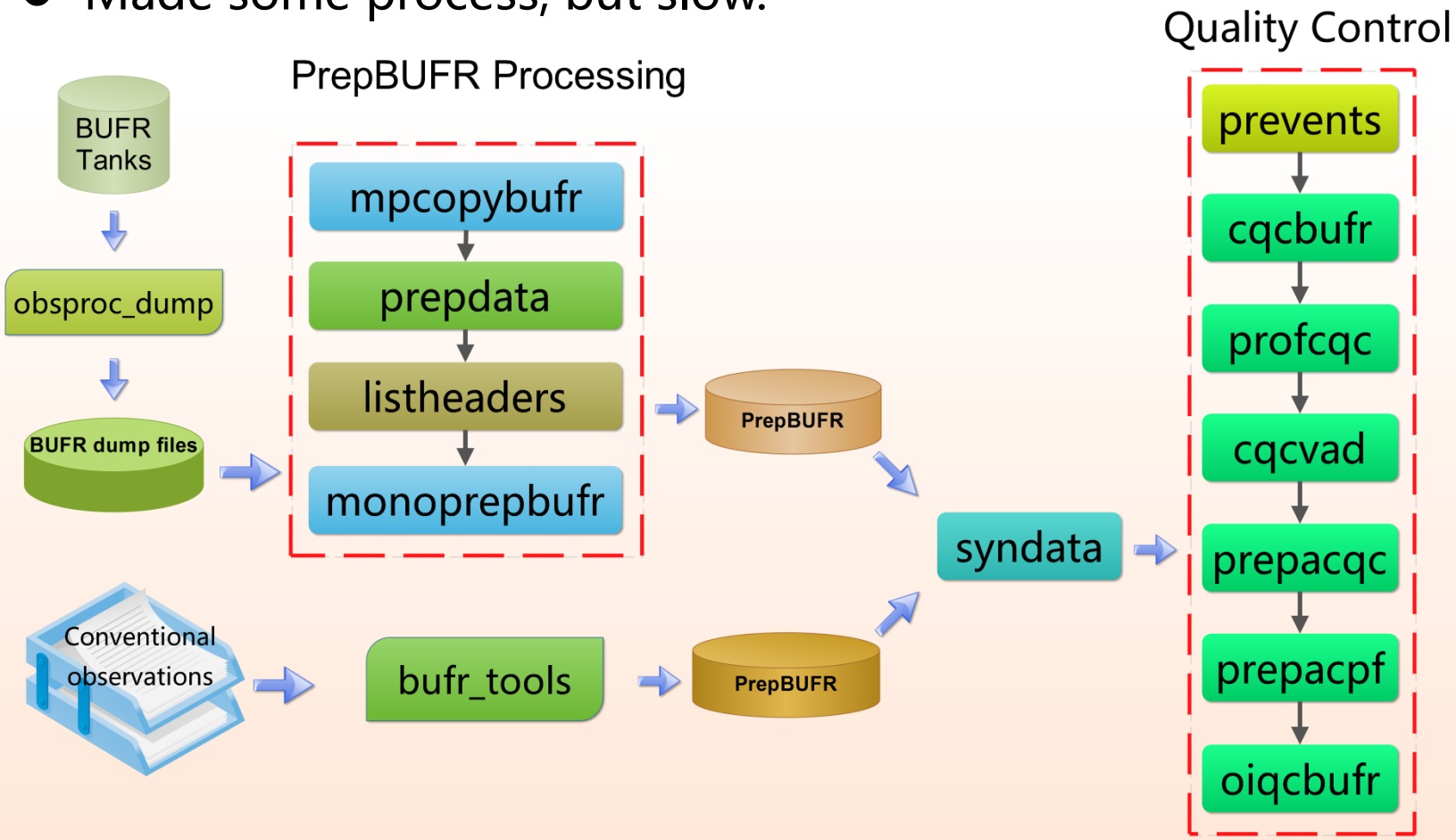
green: done
Blue: ongoing
Red: to do

Radiosonde data over China from different sources



Conventional data format conversion

- Directly convert ascii format obs into prepbufr format
- Then pass QC steps in NCEP’ s prepbufr package
- Made some process, but slow.

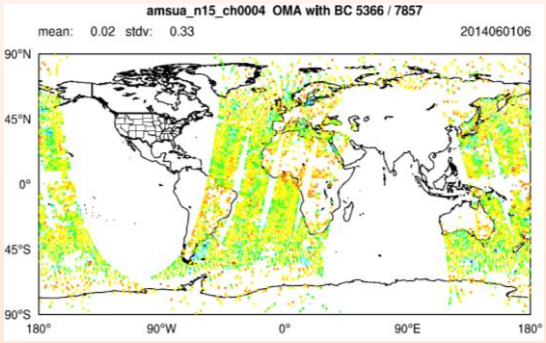


TOVS/ATOVS Level-1B BUFR conversion

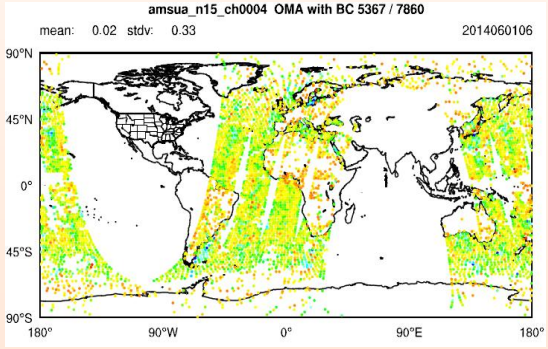
Use publically available NCEP/NCO conversion utilities

	NOAA-15	NOAA-16	NOAA-17	NOAA-18	NOAA-19	METOP-A	METOP-B
AMSU-A	√	√	√	√	√	√	√
AMSU-B	√	√	√	/	/	/	/
MHS	/	/	/	√	√	√	√
HIRS3/4	√	√	√	√	√	√	√

NMIC converted



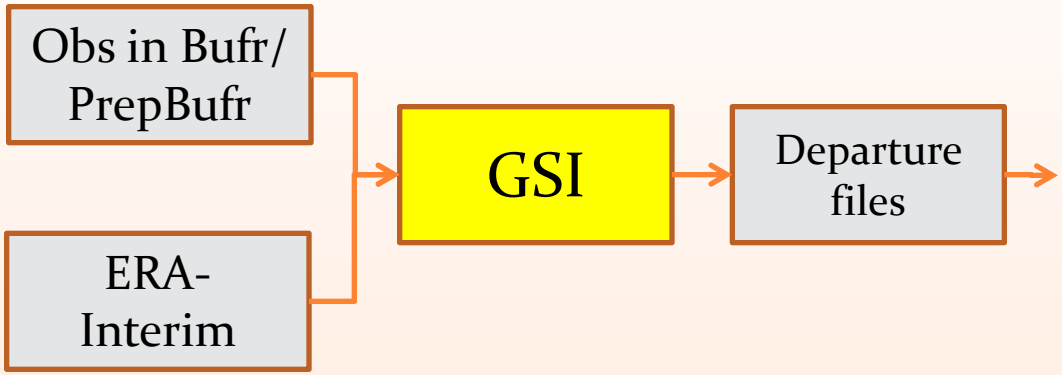
NCEP GDAS

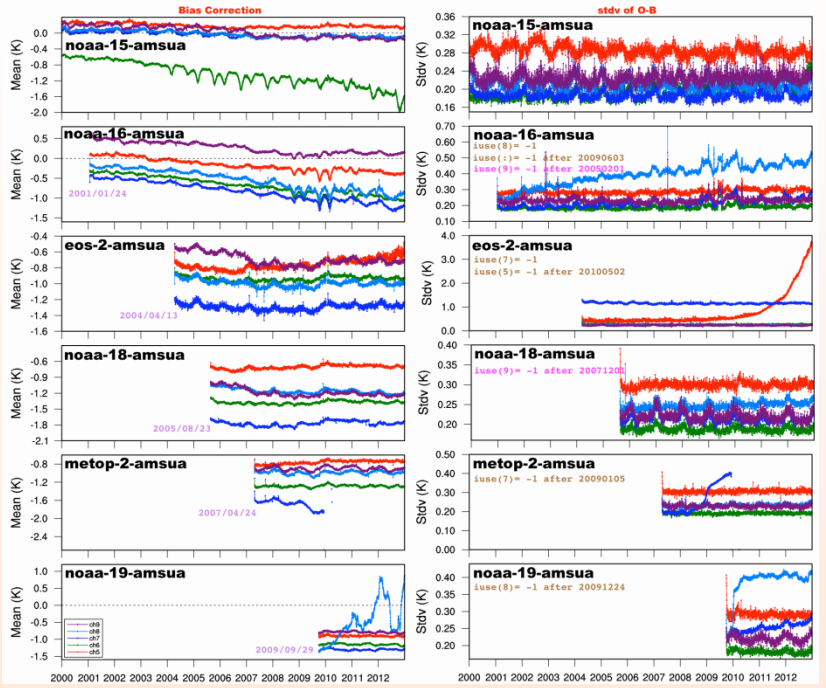


Pre-evaluation of historical obs

- Ingest the model-level ERA-Interim reanalysis into GSI to calculate its departure from various observations

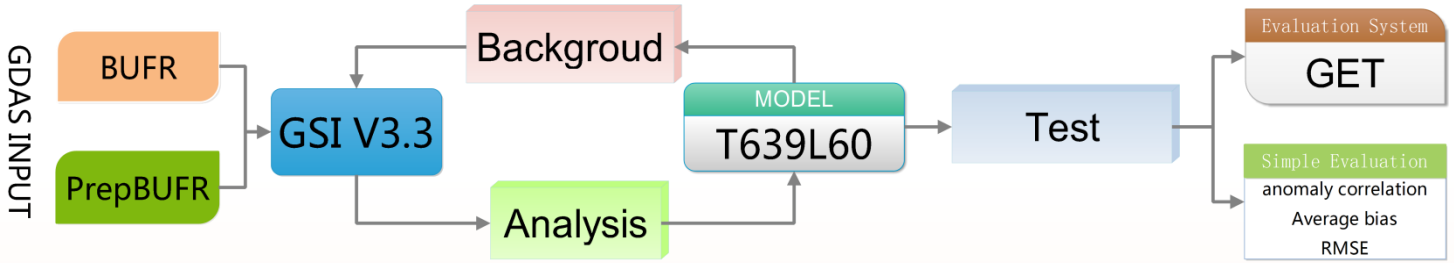
- Departure datasets can serve as the basis for QC/blacklisting/bias-correction

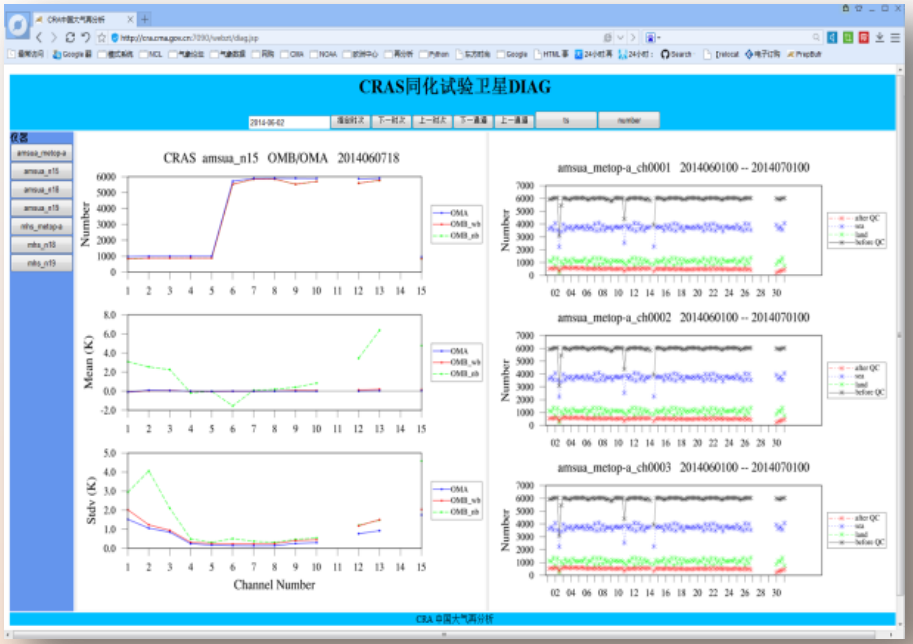


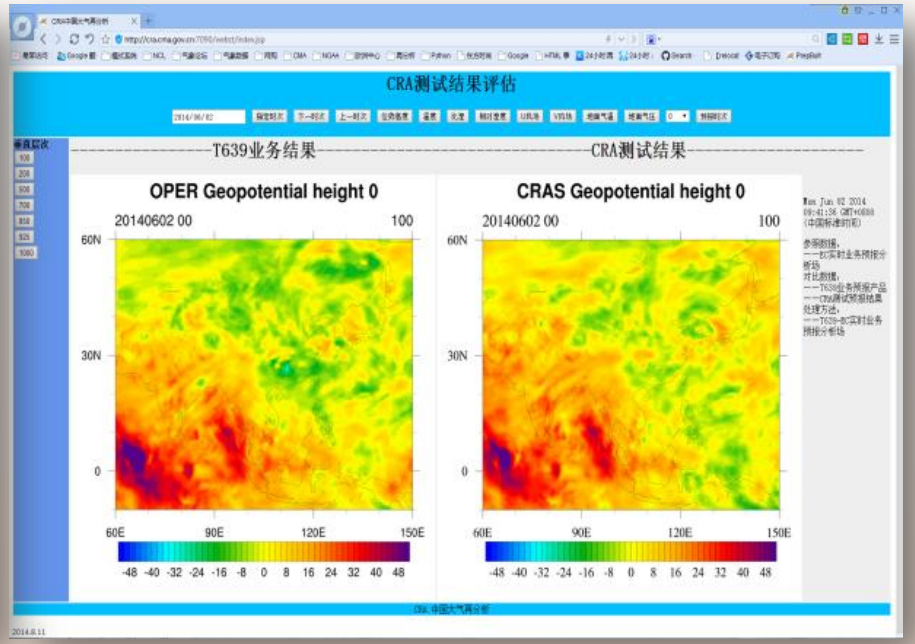


Upgrade the Operational T639L60/GSI to GSI-V3.3

- Upgraded GSI to the latest community version (V3.3).
- Short-period T639/GSI-V3.3 3DVAR experiments using NCEP GDAS Obs.







Plan in 2015

- Continue collection of observations
- Solve issues on prepbufr format conversion and QC procedures
- Produce 1~2 years experimental analysis for 2014-2015 using GSI-3DVAR (on CMA/NMIC IBM Power7 Cluster)
- Evaluate analysis/forecast results using independent data, e.g., 3rd Tibetan plateau field campaign in summer time of 2014 and 2015.